

A POSSIBLE EVOLUTIONARY SCENARIO FOR NGC 7217

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NGC 7217 is an ordinary spiral galaxy with three rings whose size ratios are such that they can be associated with resonances, as for barred spirals. From 21-cm HI line data and BVRI CCD-images of this galaxy we find (cf. Verdes-Montenegro et al. 1995) : 1) a nuclear ring strong in $H\alpha$, 2) an inner ring seen clearly in a B - I colour map, and 3) an outer ring, with blue colours and strong HI-emission. After deprojection the disk has a mean ellipticity of 0.04 ± 0.01 , while the position angle of the deprojected galaxy changes suddenly at 65° radius, where the minor axis becomes major axis. Thus a very mild oval distortion could exist, with the outer ring perpendicular to the oval. Merrifield and Kuijken (1994) find from the stellar kinematics that about 20 - 30 % of the stars are in retrograde orbits.

Did NGC 7217 have a bar which has since been destroyed ? This is possible : 1) From a simulation with sticky particles we find that rings can survive quite long after a bar has been turned off. 2) Orbit calculations show that a large fraction of the ergodic orbits present before a bar is switched off become retrograde. Thus if the bar had a substantial fraction of ergodic orbits, the presence of the retrograde orbits follows from a pendulum analogy.

There are several ways to decay the bar : 1) N-body simulations show that by hitting a barred galaxy with a companion the bar can be destroyed, and in such cases a substantial fraction of the stars is moving in retrograde orbits, as in NGC 7217. 2) A build up of a strong central mass concentration can scatter the x_1 -orbits, while temporarily increasing the fraction of ergodic orbits.